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7. Abstract

The air conveyance feature test conducted in the FMEF, Building 427/400 Area was completed on August 22, 1990. The purpose of this test was to determine the applicability and efficiency of air conveyance as a method for transporting waste dislodged from the single-shell tanks. The performance of the air conveyance system with simulated sludge was mixed. The system had difficulty in moving the waste into the feed nozzle. The sludge simulant tended to stick on the hose walls and accumulate in the horizontal hose runs, however, with the addition of water injected into the feed nozzle the major problems were greatly minimized. Future testing is required to evaluate to what extent these modifications will optimize system performance. With modifications to the air conveyance system is still expected to be the leading candidate for waste transport.

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FEATURE TEST OF AIR CONVEYANCE SYSTEM

J. F. THOMPSON

SEPTEMBER 14, 1990

CONTENTS

1.0 INTRODUCTION

Feature testing of an air conveyance system was one of several tests called for by the *Single-Shell Tank Waste Feature Test Plan* (Thompson, 1990). The feature testing was conducted August 15-22, 1990, at the Fuels and Materials Examination Facility, 427 Building,in the 400 Area of the Hanford Site. Remote Systems Engineering conducted the testing with the assistance of the Facilities Operations Group.

The objective of this test was to evaluate an "off-the-shelf" air conveyance system as a method of waste retrieval. The equipment will test an air conveyance system's ability to lift a sludge simulant up to a 60 ft elevation difference, and determine the plugging characteristic of the simulant in the hose runs. The testing program will not optimize any parameters, but will evaluate the technologies abilities to convey sludge simulant.

2.0 DESCRIPTION TEST

The unit tested is a production model portable pneumatic conveying system with the following specifications:

Brand Name: Hi-Vac Corporation[1]

Model: 240, LP Hi-Vac

Approx. Dim's:	Length	Width	Height
	6 ft.- 2 in. (1880 mm)	6 ft.- 2 in. (1880 mm)	9 ft.- 1 in. (2768 mm)

Approx. Weight: 6,100 lbs. (2766 Kg.)

Hopper Capacity: 1 - 1/2 cu. yd.

Rated Vacuum Pressure: 18 in. Hg

Air Flow: 812 CFM at 4 - 1/2 in. Hg (static)
646 CFM at 18 in. Hg (Theatrical)

GENERAL DESCRIPTION: The model 240 is an efficient, heavy duty, dust free industrial pneumatic conveying system designed for in-plant use and consists of a power module, material collection hopper, filtration system and propulsion system (see Figure 1).

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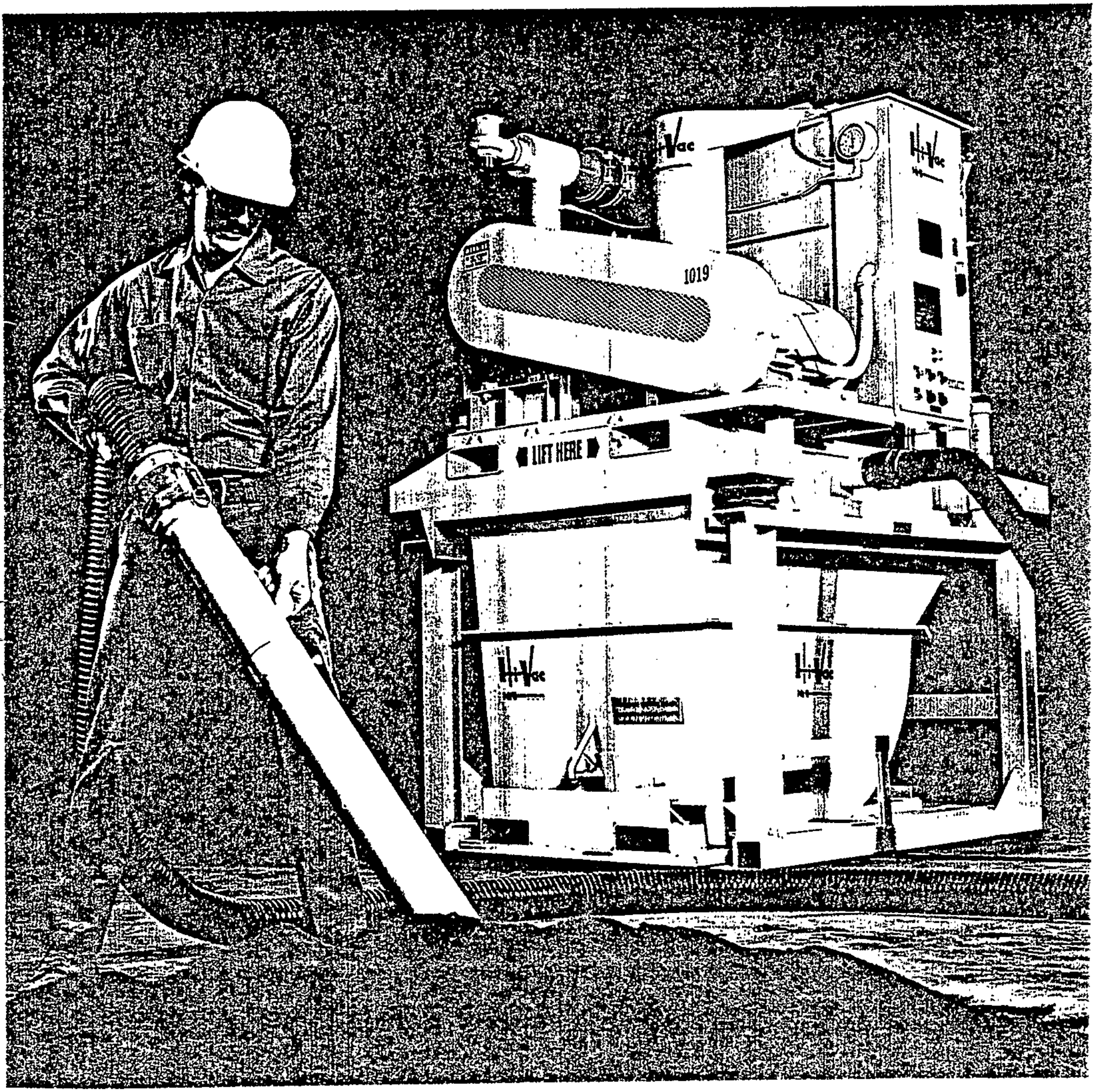
1. Trademark of the Hi-Vac Corporation, Marietta, Ohio

Figure 1. Typical Hi-Vac Vacuum Loader System.



3.0 TEST METHOD AND TEST EQUIPMENT

The testing program was divided into three sections, or tests, using a sludge simulant with a density of 100 lbs/ft^3 (Wong, 1990). The composition of the simulant is as follows:

13.5 weight percent bentonite clay (200 mesh)
32.4 weight percent barium sulfate (400 mesh)
54.1 weight percent water

The bulk density is 1.6 g/ml and the viscosity is 1.7×10^6 cp.

3.1 TEST #1

This test was designed to convey the simulant 42.5 vertical ft. The vacuum loader was located at the upper elevation and the simulant at the floor level. The hose was straight with little or no bends. Conveying measurements were determined by drum volume and observation.

3.2 TEST #2

This test was designed to convey the simulant 60 vertical ft and 40 horizontal ft. The vacuum loader was located at the upper elevation with the simulant at the floor level. The first section of hose ran 60 ft vertical with no bends. The second section of hose ran horizontal 40 ft with a 180° return. the horizontal hose run was located at the upper elevation. Conveying measurements were determined by drum volume and observation.

3.3 TEST #3

This test was divided into two parts test 3A and 3B.

3.3.1 Test #3A

This test was designed to convey simulant in the horizontal plane which was determined to be the worst case. The vacuum loader and the hose run of 50 ft were on the same elevation with numerous bends and loops in the hose.

3.3.2 Test #3B

This test was designed essentially the same as test 3A with an additional 50 ft of hose with more loops and bends.

4.0 TEST RESULTS

4.1 TEST #1

Test conditions: Elevation = 42 ft.-6 in., Hose length = 50 ft. The test setup was with an elevation difference of 42 ft-6 in. The air conveyance equipment was placed at the top elevation with the simulant at the lower elevation. The conveyance hose was 50 ft long with a 5 ft pick-up nozzle attached.

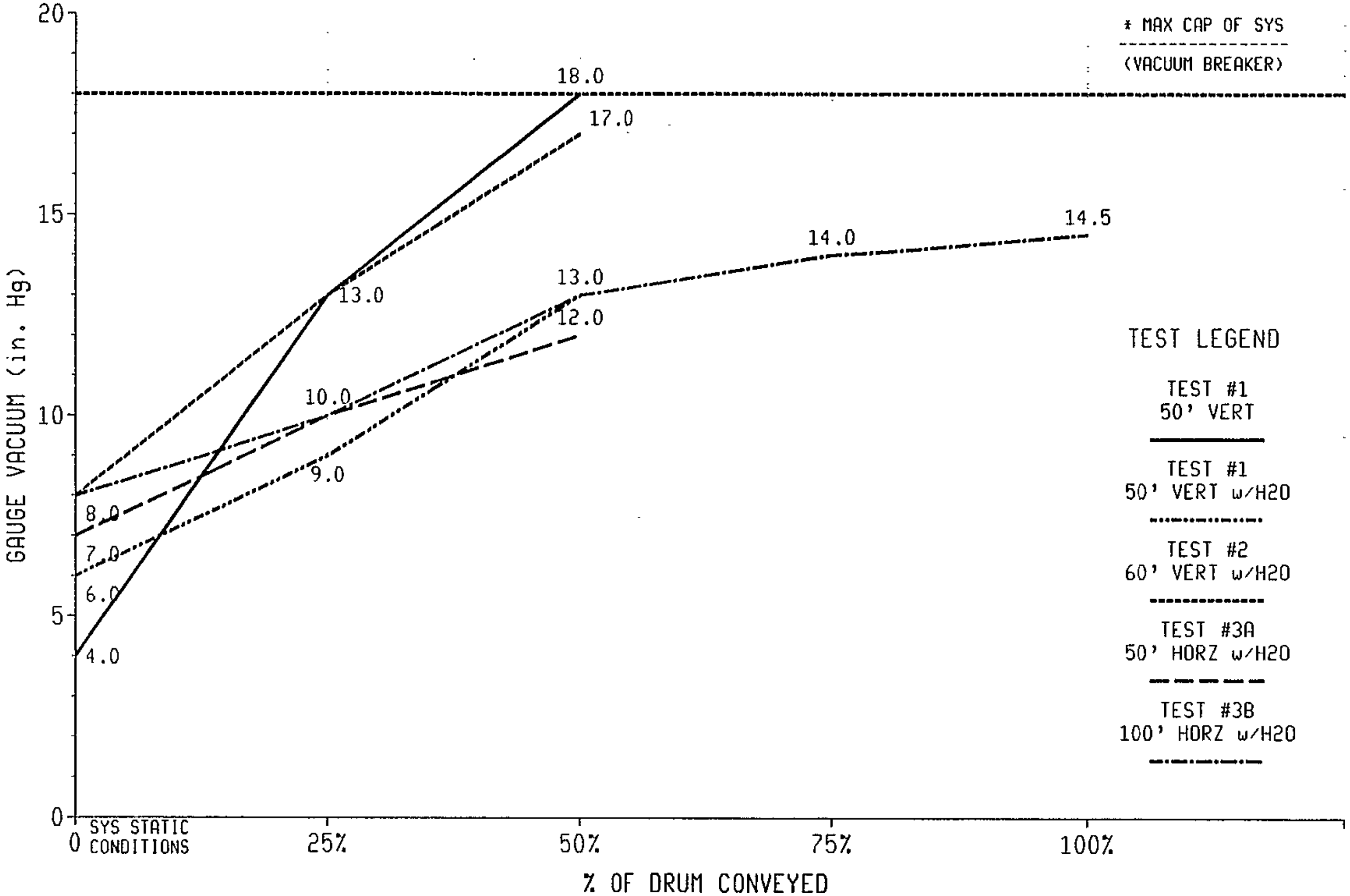
The feed nozzle that was supplied by the factory with this equipment had an air-bleed adjustment. The factory representative's instructions were to start with a wide open adjustment and then close down the air bleed until you obtained the optimum conveying rate with the equipment. He made these recommendations because of the unknown conveying characteristics of the simulant. With the air bleed wide open, the simulant conveyed in chunks or slugs. The feed nozzle had to push into the simulant to pack a slug into the pick-up, it was then necessary to pull the feed nozzle out of the simulant to allow the slug to be conveyed. This process was continued until the proper air bleed adjustment was determined. This required approximately 1/4 drum to be conveyed.

The hose was inspected and found to have approximately 1/4 in. of material coating the hose walls. It was necessary to convey water intermittently to keep the material from building up on the hose walls during the air-bleed adjustment phase. When approximately 2/3 of the drum had been conveyed the hose plugged and the vacuum breaker on the equipment opened indicating that the system had reached 18 in. Hg vacuum. The system was shut down and the hose was unplugged using a long pipe to restore an air flow.

The equipment was restarted and water was conveyed to completely clear the hose. At this point a decision was made to install a water injection system to the feed nozzle. This system was field fabricated using a 5/8 in. garden hose (approximate system pressure 65 psi) feeding a 1/4 in. ball valve and 4 ft of 1.4 in. nylon tubing, this was feed into a "U" shaped tube that was fitted into the inlet of the feed nozzle.

The final 1/3 drum was conveyed without any problems. The water injection system did not improve the feed rate but did dramatically reduce the amount of material stuck on the hose walls. See Figure 2.

<u>NOTE:</u> At the end of test 1 there was a malfunction of the vacuum loader equipment that required a call to the factory for assistance. The problem was discussed with the factory and a plan to fix the equipment was agreed upon. The problem was with a defective filter pressure differential switch that would not allow the blower to run. The factory directed solution was to bypass the faulty switch. The equipment was restarted and functioned normally.



AVERAGE VACUUM VALUES

FIGURE NO. 2

4.2 TEST #2

Test conditions: Elevation = 60 ft - 0 in., Hose length = 100 ft. Water injection system was utilized. The test setup was as follows, the simulant was located at the lower elevation and the vacuum loader located at the upper elevation. The first section of hose went 60 ft vertically. Then the hose was laid over a railing with a 180° bend and dropped 3 ft to the floor. The hose continued horizontally on the floor for 20 ft with a 180° return and ran an additional 20 ft back to the equipment where it made an 90° turn up for an additional 5 ft of elevation to the suction connection of the vacuum loader.

The simulant conveyed as before in large chunks. One half of a drum was conveyed in a 20 minute period. Much of the conveying time was spent maneuvering the very heavy hose. During conveyance the vacuum climbed steadily, see Figure 1. This was an indication that the hose was plugging. When the vacuum reached 17 in. Hg the conveying was terminated. It was determined that if conveying were continued that the hose would have plugged in a very short time. Upon inspection of the hoses it appears that the material easily made the 60 ft elevation with minimal build-up on the hose walls. At the transition from vertical to horizontal the hose was very heavy indicating that there was a lot of material held up at this location. Visual inspection of the hose and hopper confirmed that only approximately 2 of the 15 gallons of material conveyed reached the hopper and the remainder was held up in the 40 ft horizontal section of the hose. It was surmised that the system air velocity for this simulant was insufficient or that the hose length/configuration exceeded the system capacity. Samples were collected from the hose and hopper (see Figure 2).

<u>NOTE:</u> At this point the water injection system was evaluated and it was decided that more water volume was required. The system was modified by changing the 1/4 in. valve to a 3/8 in. size and also changing the 1/4 in. tubing to 3/8 in. tubing. This results in an approximate 2x increase in water volume. Test #2 was not repeated with the new water injection system, but the expected results were obtained in test #3.

4.3 RESULTS OF TEST 3

4.3.1 Test #3A

Test conditions: 50 feet of horizontal hose with the 3/8 in. Water injection system utilized. The test setup was configured with one 360° loop and three 90° bends in the hose. Again the conveying rate was not increased but the rate at which the slugs moved through the hose was improved. Half of a drum was conveyed, at this point the system was secured and the hose inspected. There was virtually no material hold up on the walls of the hose. The maximum observed vacuum reading was 12 in. Hg, during this test. See Figure 2.

4.3.2 Test #3B

Test conditions: 100 ft of horizontal hose with the 3/8 in. water injection system utilized. The test setup was configured with three 360° loops and three 90° bends in the hose. The conveying rate was the same as that of test 3A. One and one half drums of simulant were conveyed with virtually no material hold up on the hose walls. The hose condition appeared the same as in test 3A. The maximum observed vacuum reading was 14/14.5 in. Hg during the test. See Figure 2.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The air conveyance system proved to be an effective method for retrieving simulated sludge. The system that was tested was somewhat small in size, (capacity), for some of the tests performed, but showed that the technology is a sound option for waste retrieval with some modifications to the basic design. No conveying rates were established due to the nature of the sludge, and to some extent, the heavy hose and operator fatigue during the test program.

It became obvious during testing that a water injection system is imperative to prevent hose plugging while conveying undiluted sludge. The amount of water required and at what point it is injected into the system is a matter of conjecture. It is Remote Systems Engineering's recommendation that a system utilizing a water injection device at the feed nozzle and additional injection units placed along the hose runs will be necessary. Future testing of a system with a larger capacity and water injection should be tested. Also, testing of a device that will locally dislodge (fluidize) the sludge to facilitate its pick-up by the air conveyance system should be developed.

6.0 DISPOSITION OF THE TEST ITEM

The model 240 Hi-Vac equipment was a rental unit and was returned to the vendor upon completion of the testing program. The hose and miscellaneous fittings were excessed at the completion of the testing program. The simulant was returned to the Chemical Engineering Lab, Bldg 2703-E/200E Area of the Hanford Site for storage/disposal.

7.0 REFERENCES

Thompson, J. F., 1990, *Single Shell Tank Waste Retrieval*, WHC-SD-ER-TP-002, Westinghouse Hanford Company, Richland, Washington.

Wong, J. J., 1990, *Recipe Document for SST Waste Simulants*, WHC-SD-ER-TI-002, Westinghouse Hanford Company, Richland, Washington.

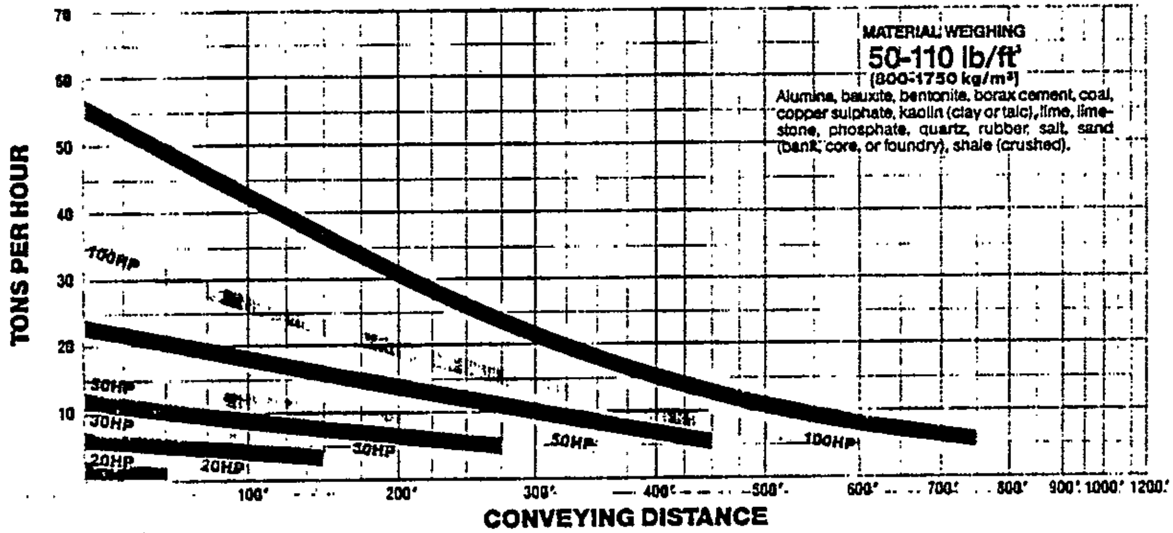
APPENDIX A

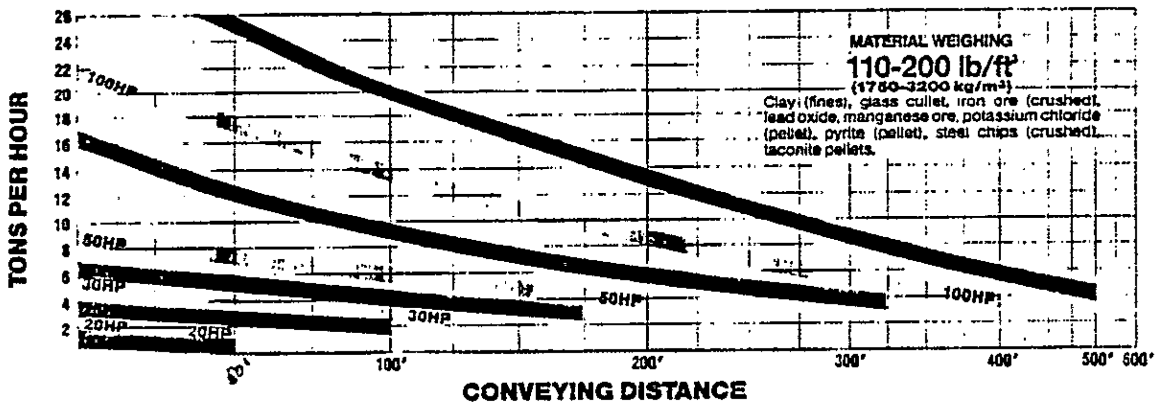
VENDOR INFORMATION

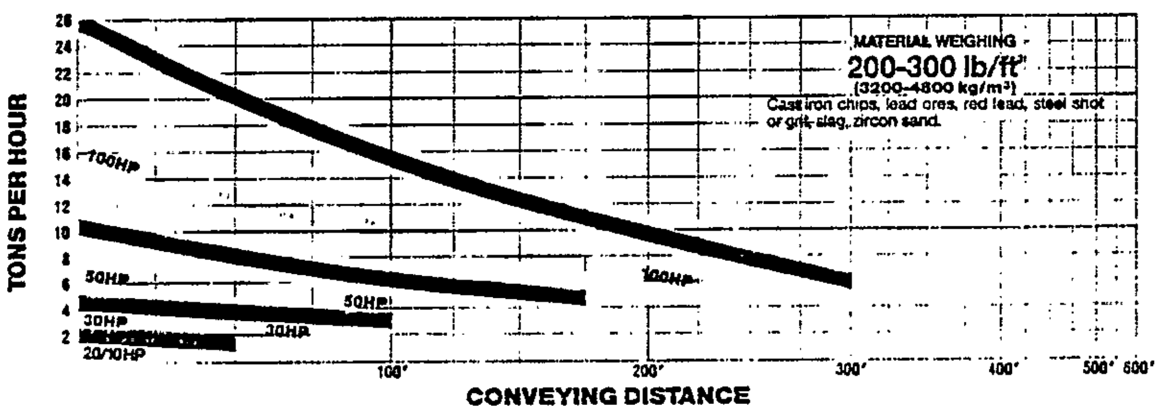
These charts will help you determine how much Hi-Vac horsepower you'll need to pick up and convey your material over a given distance, at a given rate.

1. Use the chart which corresponds to the weight of the material you'll be vacuuming.
2. Along the bottom of the chart, find your intended conveying distance.
3. Read up and across to find the ton-per-hour capacities of various size Hi-Vacs.

Caution: These figures are based on a maximum particle size of 1/2" (13 mm) and will vary depending on flowability, number of bends, vertical elevation, hose resistance, coupling loss, etc. Conveying rates shown are for continuous operation.







3

powerhead specifications

	10 HP	20 HP	25 HP	30 HP	40 HP	50 HP	75 HP	100 HP	150 HP	200 I
300 Series	MODEL **310** Horsepower 10 HP (7.5 kW) Weight 1,750 lb (795 kg) Air/cloth ratio 2.2 to 1*	MODEL **320** Horsepower 20 HP (15 kW) Weight 2,150 lb (975 kg) Air/cloth ratio 4.2 to 1*								
200 LC Series		MODEL **220 LC** Horsepower 20 HP (15 kW) Weight 2,870 lb (1 300 kg) Air/cloth ratio 2.1 to 1*		MODEL **230 LC** Horsepower 30 HP (22.5 kW) Weight 3,750 lb (1 700 kg) Air/cloth ratio 4.3 to 1*	MODEL **240 LC** Horsepower 40 HP (30 kW) Weight 3,950 lb (1 790 kg) Air/cloth ratio 5.1 to 1*					
200 Series			MODEL **225** Horsepower 25 HP (18.5 kW) Weight 3,000 lb (1 360 kg) Air/cloth ratio 1.7 to 1*	MODEL **230** Horsepower 30 HP (22.5 kW) Weight 4,100 lb (1 860 kg) Air/cloth ratio 2.2 to 1*	MODEL **240** Horsepower 40 HP (30 kW) Weight 4,300 lb (1 950 kg) Air/cloth ratio 2.7 to 1*	MODEL **250** Horsepower 50 HP (37.5 kW) Weight 4,450 lb (2 020 kg) Air/cloth ratio 3.6 to 1*				
400 Series						MODEL **450** Horsepower 50 HP (37.5 kW) Weight 4,650 lb (2 110 kg) Air/cloth ratio 2.9 to 1*	MODEL **475** Horsepower 75 HP (56 kW) Weight 5,200 lb (2 360 kg) Air/cloth ratio 4.5 to 1*			
500 Series		MODEL **520** Horsepower 20 HP (15 kW) Weight 4,990 lb (2 265 kg) Air/cloth ratio 2.3 to 1*			MODEL **540** Horspower 40 HP (30 kW) Weight 4,990 lb (2 265 kg) Air/cloth ratio 4.1 to 1*	MODEL **550** Horsepower 50 HP (37.5 kW) Weight 8,300 lb (3 765 kg) Air/cloth ratio 5.5 to 1*	MODEL **575** Horsepower 75 HP (56 kW) Weight 8,300 lb (3 765 kg) Air/cloth ratio 4.5 to 1*			
2000 Series							MODEL **2075** Horsepower 75 HP (56 kW) Weight 8,000 lb (3 630 kg) Air/cloth ratio 2.8 to 1*	MODEL **2100** Horsepower 100 HP (74.5 kW) Weight 8,000 lb (3 630 kg) Air/cloth ratio 3.9 to 1*	MODEL **2150** Horsepower 150 HP (112 kW) Weight 9,500 lb (4 310 kg) Air/cloth ratio 5.8 to 1*	MODE. **220** Horsepow 200 HP (145 Weight 12,000 (5 445 Air/cloth r 5.8 to 1

*At rated vacuu

4

Use the "pickup capacity" charts on pages 2 and 3 to determine the horsepower required for your application. Then use this chart to select the proper Hi-Vac powerhead for the job.

1. Find the required horsepower along the top of the chart.
2. Read down to find which Hi-Vac models are available in that horsepower rating.
3. Read across for the specifications and dimensions of each model.

NOTE: Custom engineered Hi-Vac models are available. Please consult your NFE International Ltd. representative or the factory.

Specifications subject to change without notice.

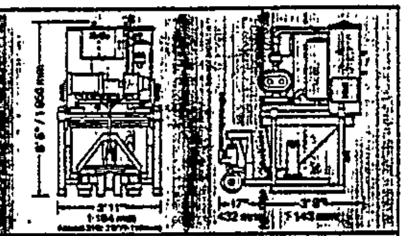
HP

300 Series

DESCRIPTION
300 Series Hi-Vacs are compact, fully-equipped vacuums. A hand truck with hydraulic lift is provided for moving the unit and removing the 10 ft³ (0.28 m³) hopper for dumping. Larger capacity bottom-dump hoppers are also available for stationary installations.

STANDARD FEATURES
18" Hg (457 mm Hg)** maximum suction
Electric motor
Manual bag shaker
10 ft³ (0.28 m³) collection hopper

OPTIONS
Diesel, LP, or gas engines
Sound enclosure
HEPA filtration system
Hi temp. operation package
Automatic bag shaker
Explosion-proof controls***
Other features available to suit specific applications

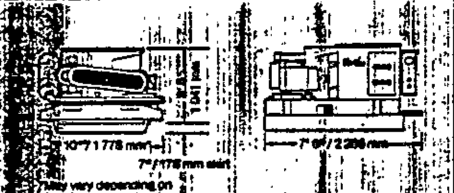


200 LC Series

DESCRIPTION
200 LC Series Hi-Vacs are designed for low clearance applications. They provide virtually the same performance as the 200 Series, but are 20" (508 mm) lower in overall height. They can be used in any of the portable, fixed, or trailer configurations shown on the back page.

STANDARD FEATURES
18" Hg (457 mm Hg)** maximum suction
Electric motor with 1.15 service factor
Automatic bag shaker
Broken bag detector
Solid state control panel with fail-safe protection systems

OPTIONS
Diesel, LP, or gas engines
Sound enclosure
HEPA filtration system
Hi temp. operation package
Explosion-proof controls***
Epoxy coating for corrosives
Other features available to suit specific applications



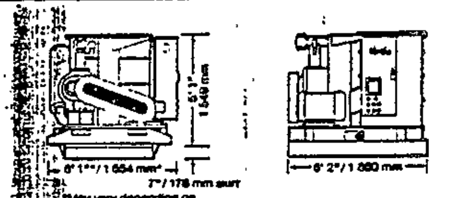
*May vary depending on size of motor used.

200 Series

DESCRIPTION
200 Series Hi-Vacs are the most versatile models. They can be used in all of the portable, stationary, and trailer configurations shown on the back page.

STANDARD FEATURES
18" Hg (457 mm Hg)** maximum suction
Electric motor with 1.15 service factor
Automatic bag shaker
Broken bag detector
Solid state control panel with fail-safe protection systems

OPTIONS
Diesel, LP, or gas engines
Sound enclosure
HEPA filtration system
Explosion-proof controls***
Hi temp. operation package
Epoxy coating for corrosives
Other features available to suit specific applications



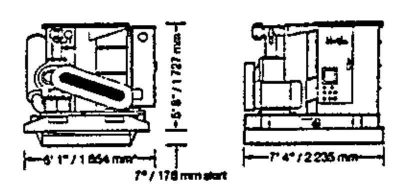
*May vary depending on size of motor used.

400 Series

DESCRIPTION
400 Series Hi-Vacs can be used with larger hose diameters and have more cloth filter area for better filtration characteristics with very fine, powdery materials. They can be used in all of the portable, stationary, and trailer configurations shown on the back page.

STANDARD FEATURES
18" Hg (457 mm Hg)** maximum suction
Electric motor with 1.15 service factor
Automatic bag shaker
Broken bag detector
Solid state control panel with fail-safe protection systems

OPTIONS
Diesel, LP, or gas engines
Sound enclosure
HEPA filtration system
Hi temp. operation package
Continuous filter cleaning
Explosion-proof controls***
Epoxy coating for corrosives
Other features available to suit specific applications



*May vary depending on size of motor used.

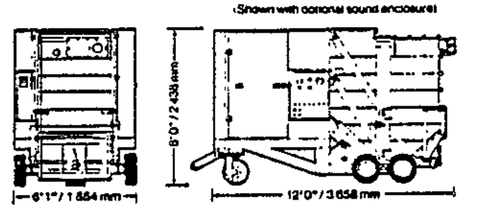
500 Series

DESCRIPTION
500 Series Hi-Vacs incorporate a 1 cubic meter collection hopper with a bottom discharge gate. Several configurations are available including a trailer unit (shown with optional 5' hydraulic lift on the collection hopper), truck mounted, and stationary units.

STANDARD FEATURES
18" Hg (457 mm Hg)** maximum suction
Automatic bag shaker
Diesel engine
35.3 ft³ (1 m³) collection hopper with bottom discharge gate

OPTIONS
Sound enclosure
HEPA filtration system
LP, electric, or gas engines
Hydraulic lift/discharge gate
125 ft³ (3.5 m³) hopper
Continuous filter cleaning
Explosion-proof controls***
Fail-safe protection systems
Hi temp. operation package

(Shown with optional sound enclosure)

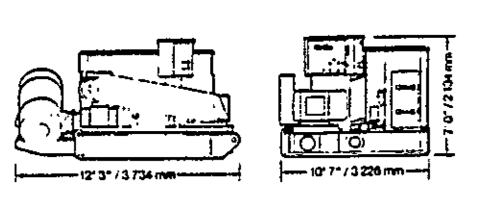


2000 Series

DESCRIPTION
2000 Series Hi-Vacs are designed for high volume or long distance conveying. They're available as a stationary vacuum with a variety of bottom-discharge hoppers or with a special trailer and hopper.

STANDARD FEATURES
18" Hg (457 mm Hg)** maximum suction
*Model 2200: 22" Hg***
Electric motor with 1.15 service factor
Automatic bag shaker
Broken bag detector
Solid state control panel with fail-safe systems

OPTIONS
22" Hg (559 mm Hg)** blower
Diesel, LP, or gas engines
Sound enclosure
HEPA filtration system
Hi temp. operation package
Continuous filter cleaning
Explosion-proof controls***
Other features available to suit specific applications



**At sea level. ***Not available on engine-drive Hi-Vacs.

5

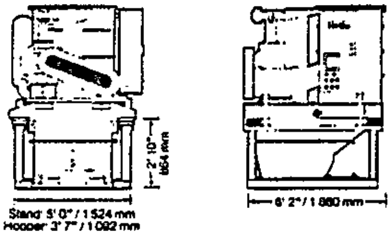
hoppers and stands

All Hi-Vacs in the 200, 200 LC, and 400 Series can be used with any of the hoppers and stands shown here. Similar equipment is also available for other Hi-Vac models. Please consult your NFE International representative or the factory.

PORTABLE HOPPERS

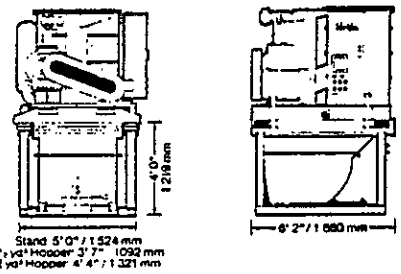
1 Cubic Yard Hopper

Self-dumping design



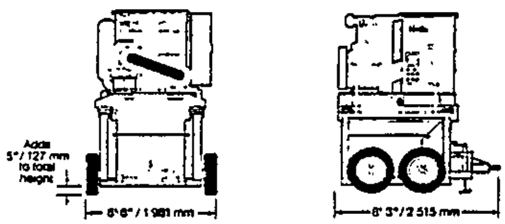
1½ & 2 Cubic Yard Hoppers

Self-dumping design



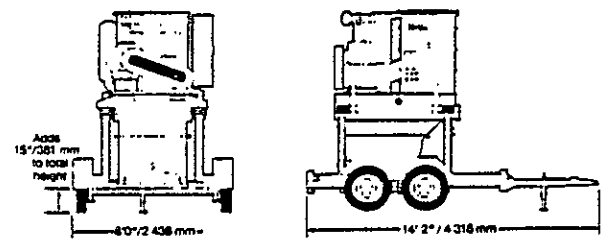
In-Plant Trailers

2 or 4 wheels. Pneumatic or solid tires.



Highway Trailer

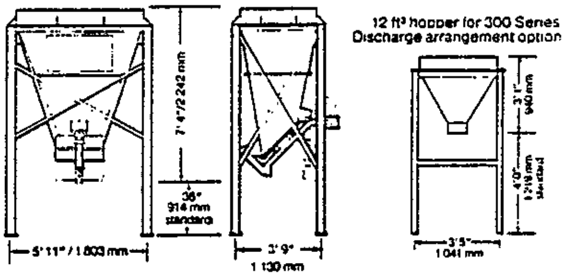
For towing at up to 50 MPH



STATIONARY HOPPERS

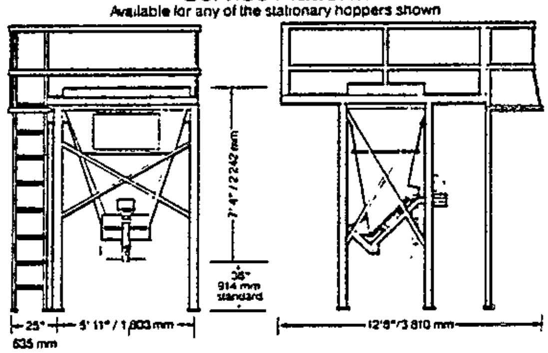
Bottom Discharge Hopper*

Counterweighted gate for intermittent discharge



Service Platform

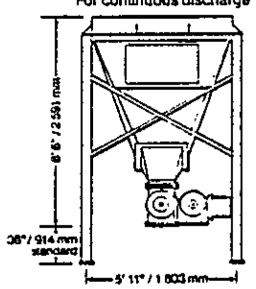
Available for any of the stationary hoppers shown



*Available in 50 ft³ (shown) or 30 ft³ versions (1.4 or 0.85 m³). For 30 ft³ hopper, subtract 12" (305 mm) from total height.

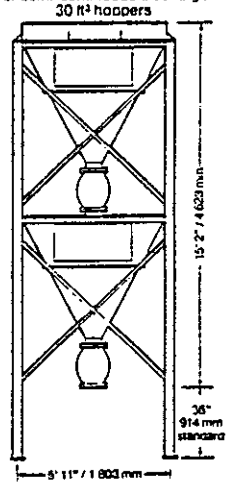
Rotary Valve Hopper*

For continuous discharge



Pinch Valve Hoppers

For semi-continuous discharge.
30 ft³ hoppers



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P.O. Box 1277, Station B, Burlington, Ont L7P3S9 • 416-634-2342

Specifications subject to change without notice.
U.S. Patent Numbers 3780502, 3905621, 4036614, 4062664, 4111670, and 4174206.
Other U.S. and foreign patents issued and pending.

APPENDIX B

DATA SHEETS

DATA SHEET TEST #1 (Without Water) Page 1 of 1

TEST ENGINEERS: J. F. Thompson DATE: 8/15/90

D. T. Ruff

SIMULANT VOLUME: 30 Gal (PER BARREL)

SIMULANT WEIGHT: 400 (PER BARREL)

SIMULANT DENSITY: 1.6 g/mL (99.8 lbs/ft^3)

DESCRIPTION OF SIMULANT: The simulant can best be described as a cohesive, yield pseudoplastic paste, and not a pourable slurry, light beige in color.

STATIC CONDITION:

VACUUM (MANUFACTURERS SPECS): 4 in. Hg

SCFM THROUGHPUT (MANUFACTURERS SPECS): 812 SCFM (static)

OBSERVATIONS IN STATIC CONDITION: Elevation = 42 ft-6 in., Hose Length = 50 ft. The simulant is located at the 0 ft-0 in. location with the vacuum loader located at the 42 ft-6 in. location. This is for vertical conveyance.

DATA SHEET TEST #1, CONT'D (With Water) Page 1 of 1

TEST ENGINEERS: J. F. Thompson DATE: 8/17/90

D. T. Ruff

SIMULANT VOLUME: 30 Gal (PER BARREL)

SIMULANT WEIGHT: 400 (PER BARREL)

SIMULANT DENSITY: 1.6 g/mL

DESCRIPTION OF SIMULANT: The simulant can best be described as a cohesive, yield pseudoplastic paste, and not a pourable slurry, light beige in color.

STATIC CONDITION:

VACUUM (MANUFACTURERS SPECS): 4 in. Hg

SCFM THROUGHPUT (MANUFACTURERS SPECS): 812 SCFM (static)

OBSERVATIONS IN STATIC CONDITION: Elevation = 42 ft-6 in., Hose Length = 50 ft. The simulant is located at the 0 ft-0 in. location with the vacuum loader located at the 42 ft-6 in. location. This is for vertical conveyance with a water injection system in use.

DATA SHEET TEST #2

TEST ENGINEERS: J. F. Thompson

DATE: 8/21/90

D. T. Ruff

SIMULANT VOLUME: 30 Gal (PER BARREL)

SIMULANT WEIGHT: 400 (PER BARREL)

SIMULANT DENSITY: 1.6 g/mL

DESCRIPTION OF SIMULANT: The simulant can best be described as a cohesive, yield pseudoplastic paste, and not a pourable slurry, light beige in color.

STATIC CONDITION:

VACUUM (MANUFACTURERS SPECS): 8 in. Hg

SCFM THROUGHPUT (MANUFACTURERS SPECS): 812 SCFM (static)

OBSERVATIONS IN STATIC CONDITION: Elevation = 60 ft-0 in., Hose Length = 100 ft. The water injection system is in use. The simulant is located at the lower elevation and the vacuum loader is located at the upper elevation. The hose run is as follows: 60 ft vertical, 40 ft horizontal with a 180° bend. The horizontal hose run is located at the upper elevation.

DATA SHEET TEST #3B

TEST ENGINEERS: J. F. Thompson DATE: 8/22/90

D. T. Ruff

SIMULANT VOLUME: 30 Gal (PER BARREL)

SIMULANT WEIGHT: 400 (PER BARREL)

SIMULANT DENSITY: 1.6 g/mL

DESCRIPTION OF SIMULANT: The simulant can best be described as a cohesive, yield pseudoplastic paste, and not a pourable slurry, light beige in color.

STATIC CONDITION:

VACUUM (MANUFACTURERS SPECS): 8 in. Hg

SCFM THROUGHPUT (MANUFACTURERS SPECS): 812 SCFM (static)

OBSERVATIONS IN STATIC CONDITION: Elevation = 0 ft-0 in. (horizontal test), Hose Length = 100 ft with three 360° loops and three 90° bends in hose. The larger water injection system is in use.

DATA SHEET TEST #3A

TEST ENGINEERS: J. F. Thompson DATE: 8/22/90

D. T. Ruff

SIMULANT VOLUME: 30 Gal (PER BARREL)

SIMULANT WEIGHT: 400 (PER BARREL)

SIMULANT DENSITY: 1.6 g/mL

DESCRIPTION OF SIMULANT: The simulant can best be described as a cohesive, yield pseudoplastic paste, and not a pourable slurry, light beige in color.

STATIC CONDITION:

VACUUM (MANUFACTURERS SPECS): 7 in. Hg

SCFM THROUGHPUT (MANUFACTURERS SPECS): 812 SCFM (static)

OBSERVATIONS IN STATIC CONDITION: Elevation = 0 ft-0 in. (horizontal test), Hose Length = 50 ft with one 360° loop and three 90° bends. A larger water injection system is being utilized.